

Propagation of high energy electrons in solar plasma

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Recently it was discovered (Mel'nik,1995; Mel'nik and Kontar, 1998; Mel'nik et al.,1999) that high energy electrons propagate in plasma in the form of a new nonlinear object, beam-plasma structure. Its main properties, like the invariable form, the constant velocity, the capacity to move at large distances without any energy loss, and interaction with each other, are identical to those for another well-known nonlinear object, soliton. The beam-plasma structure is a compound object involving electrons and Langmuir waves. The physical cause of the structure formation is the generation of Langmuir waves at the front of the beam-plasma structure and absorption of these waves at the back of it. The beam-plasma structure is a source of emission because of plasma mechanism. The rigorous expression for the emission intensity of beam-plasma structure that defined by high energy electron parameters (density, velocity) has been found. This gives an opportunity both to understand the phenomenon of burst-like character of nonthermal radio emission and to receive the information about the state of the coronal plasma. The obtained results are applied to the properties of Type III bursts.

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